PATENT
Attorney Docket № 03-0272

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Mahmoud Jibbe
Serial №	:	10/629,877
Filed	:	July 29, 2003
Group Art Unit	:	2188
Examiner	:	Doan, Duc T.
For	:	A METHOD FOR ESTABLISHING A REDUNDANT ARRAY CONTROLLER MODULE IN A STORAGE ARRAY NETWORK

MS Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL OF APPEAL BRIEF

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Penny L. Bartholomew   DATED: February 7, 2007

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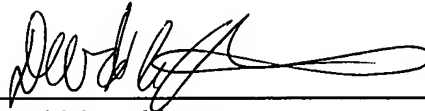
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APPELLANTS' BRIEF

This is an appeal from the final Office Action dated September 6, 2006, rejecting
Claims 1-12 and 14-27.

(1)   REAL PARTY IN INTEREST

The real party in interest is LSI Logic, Inc., the assignee of the entire interest.

(2)   RELATED APPEALS AND INTERFERENCES

Appellants are not aware of any related appeals, interferences or judicial
proceedings.

(3)   STATUS OF CLAIMS

The application was filed on July. 29, 2003 with twenty-seven (27) claims, of
which Claims 1, 10, and 22 are independent.

All of the claims were rejected in the non-final Office Action dated September 29,
2005.

In Appellants' response dated December 28, 2005, Claim 1 was amended and arguments were made indicating the patentability of Claims 1-27 over the proffered references.

The Examiner rejected all the claims in the non-final Office Action dated March 10, 2006.

In Appellants' response dated June 12, 2006, Claims 10 and 14 were amended, Claim 13 was cancelled, and arguments were made indicating the patentability of Claims 1-12 and 14-27 over the proffered references.

The Examiner rejected all the claims in the final Office Action dated September 6, 2006.

In Appellants' response dated October 17, 2006, arguments were made indicating the patentability of Claims 1-12 and 14-27 over the proffered references.

The Examiner, in an Advisory Action, asserted that Appellants' arguments were not persuasive.

Appellants filed a Notice of Appeal dated November 29, 2006.

The status of the claims is as follows:

Claims rejected: Claims 1-12 and 14-27

Claims allowed: none

Claims withdrawn: none

Claims objected to: none

Claims canceled: Claim 13

Claims appealed: Claims 1-12 and 14-27

(4)   STATUS OF AMENDMENTS

No amendment to the claims has been submitted since the final Office Action dated September 6, 2006.

(5)   SUMMARY OF CLAIMED SUBJECT MATTER

Independent Claim 1 provides:

A storage array network, comprising:

a first and second storage array controller module, wherein each storage array controller module has a first and second array controller unit; and

an array of storage devices,

wherein the first storage array controller module is a primary storage array controller that performs storage array controller functions and the second storage array controller module is a redundant back up,

wherein the first storage array controller module provides an availability signal to the second storage array controller module,

wherein if the second storage array controller module does not receive a signal from the first storage array controller module within a given period of time, the second storage array controller module asserts control over the array of storage devices. (Specification, paragraphs 5, 6, 12, 13 and 14; FIG. 1, reference characters 20, 30, 72, 74, 82, 84, 90, 100, 102, 106, 112, 116).

Independent Claim 10 provides:

A method for maintaining operation of a storage array network system, comprising:

submitting a command to a primary array controller module and a secondary array controller module;

performing a handshaking protocol between the primary array controller module and the second array controller module to determine which of the primary and the second array controller modules is to process the command;

removing the command from a queue of the secondary array controller module; and

timing of an aspect of the command.
(Specification, paragraphs 5, 7, 12, 15, 16, 17, 18, 19, and 20; FIG. 2, reference characters 220, 230, 240, 250, and 260, and FIG. 3, reference characters 315, 320, 325, 330, 335, 340, 345, 350, 355, 360, 365, and 370)

Independent Claim 22 provides:

A method for establishing a redundant array controller module in a storage array

network, comprising:

receiving a command by primary and secondary array controller modules from a host;

storing the command within two queues, each of the queues being associated with one of the primary and secondary array controller modules;

if the primary array controller module processes the command before a time out, then removing the command from the queue of the secondary array controller module; and

if the primary array controller module times out, then processing the command by the secondary array controller module.

(Specification, paragraphs 5, 7, 21, and 22; FIG. 4, reference characters 520, 530, 540, 550, 560, 570, and 580).

(6)   GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-2, 4 and 8-9 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Sawdy et al., U.S. Patent No. 6,351,831 (Sawdy) in view of Rauscher, U.S. Patent No. 6,874,100 (Rauscher) and further in view of Cruyningen, U.S. Publication 2002/0019897 (Cruyningen).

Claim 3 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Sawdy, Rauscher, and Cruyningen in further view of Brocade (Quick loop data sheet).

Claims 5-7 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Sawdy, Rauscher, Cruyningen, in further view of Deng, U.S. Patent 6,937,608 (Deng).

Claims 10-12, 14-18, 20, and 22-27 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Sawdy, Rauscher, Cruyningen, in further in view of Workman et al., U.S. Publication 2004/0068591 (Workman), and Jantz, U.S. Patent No. 5,944,838 (Jantz).

Claims 19 and 21 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Sawdy, Rauscher, Cruyningen, Workman, Jantz, in further view of Ito et al., U.S. Publication 2003/0014600 (Ito).

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(7)   ARGUMENT

<u>Claims 1-2, 4 and 8-9</u>

The issue is whether the Examiner has properly rejected Claims 1-2, 4 and 8-9 under 35 U.S.C. §103(a) as being unpatentable over Sawdy et al., U.S. Patent No. 6,351,831 (Sawdy) in view of Rauscher, U.S. Patent No. 6,874,100 (Rauscher) and further in view of Cruyningen, U.S. Publication 2002/0019897 (Cruyningen).

The present application provides a novel and non-obvious method and system exploiting the failure handling capability of primary and secondary array controller modules, each comprising a first and second array controller unit, a switch and a state machine for lock step synchronization between the primary and secondary controller modules.   Thus, in addition to redundantly controlling an array of storage devices, expanded failure handling is provided.   Expanded failure handling may include: controller module failure wherein both array controllers in a module are prevented from accessing the drive trays, active controller failure wherein the alternate controller is prevented from accessing the drive trays, and standby controller failure wherein the active array controller is prevented from accessing the drive trays.

"To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings.   Second, there must be a reasonable expectation of success.   Finally, <u>the prior art reference (or references when combined) must teach or suggest all the claim limitations</u>." (emphasis added) (MPEP § 2143).   <u>If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious.</u>   (emphasis added)   *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

Claim 1 includes elements that have not been disclosed, taught or suggested by Sawdy, Rauscher, and Cruyningen.   The Examiner cited to Sawdy as describing "a

storage array network, comprising: a first and second storage array controller module (Fig 2: #210, 212), wherein each storage array controller module has a first and second array controller unit; and an array of storage devices (Fig 5: #70), wherein the first storage array controller module is a primary storage array controller that normally performs storage array controller functions and the second storage array controller module is a redundant back up (col. 1 lines 1-20)." Sawdy does not disclose a first and second storage array controller module wherein each storage array controller module has a first and second array controller unit. Sawdy is directed to determining whether cabling is correctly connected and whether storage devices are identically referenced between two RAID controllers. Sawdy discloses two RAID controllers, not two storage array controller modules. The two storage array controller modules in the present invention each contain two controller units. The RAID controllers in Sawdy are just composed of a single RAID controller. The RAID controllers in Sawdy are better likened to the storage array controller units of the present invention, not the storage array controller modules that contain two storage array controller units. Further, Sawdy does not state that one RAID controller is primary and the other is a redundant backup. Sawdy merely states that there are two RAID controllers for redundancy. Rauscher and Cruyningen do not cure Sawdy's defects.

The Examiner correctly admitted that Sawdy does not describe the claimed aspect of a heartbeat signal between the storage array controller modules. The Examiner then cited to Rauscher as describing "an active RAID system with multiple controllers in which the controllers are communicating with each other via heartbeat connections (col. 2 lines 56-68)." The Examiner stated it was obvious to include the heartbeat connect suggested by Rausner in Sawdy's system to inform each controller the status of the other controller and thereby allowing the other controller quickly take over the failed controller automatically. Raushcher fails to disclose a first storage array controller module which provides an availability signal to the second storage array controller module, and if the second storage array controller module does not receive a signal from the first storage array controller module within a given period of time, the second storage array controller module asserts control over the array of storage

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devices. The Examiner cites column 2, lines 57-68 of Rauscher for support of its assertion. However, Raushcher fails to disclose a first storage array controller module which provides an availability signal to the second storage array controller module. Further, Rauscher fails to disclose if the second storage array controller module does not receive a signal from the first storage array controller module within a given period of time, the second storage array controller module asserts control over the array of storage devices. Rauscher merely mentions a heartbeat signal with no time limitation. Also, Rauscher does not mention that the heartbeat signal is provided by one controller to the other and that it is an availability signal. The Examiner stated that the heartbeat signal by definition is communicated periodically and that the time period is the period of the heartbeat signal and that failure to receive the heartbeat signal means the other redundant storage system is in failure. However, the Examiner does not cite to a source for this asserted definition.

Additionally, Rauscher further states problems associated with the heartbeat signal which would motivate others not to operate with a heartbeat signal. (Rauscher, Column 2, Lines 62-67). In response, the Examiner cited to Rauscher col. 3 lines 1-16. However, col. 3 lines 1-16 do not cure the problems with a heartbeat signal. In col. 3 lines 1-16, Rauscher is concerned with double cabling to proof a RAID system against any single point of failure, not utilization of a heartbeat signal. Rauscher utilizes double cabling instead of a heartbeat signal because a heartbeat signal is a single point of failure. A heartbeat signal can cause a RAID system to fail if the heartbeat connection fails but both controllers are still operating. In col. 3 lines 1-16 Rauscher utilizes double cabling to protect against failure instead of a heartbeat signal. Therefore, because col. 3 lines 1-16 does not fix the disclosed problem with heartbeat signals, Rauscher does not motivate the utilization of heartbeat signals. Sawdy and Cruyningen fail to cure the defects of Rauscher.

The Examiner next correctly admitted that Sawdy and Rausner do not disclose the claimed detail of first and second array controller units. The Examiner then cited to Cruyningen as describing "a storage array configuration (Fig 7) in which multiple disk

units (Fig 7 disks in unit 20a and 20b) are grouped and controlled by the controller (Fig 7: #10)." The Examiner stated it was obvious to include the grouping of disks into units as suggested by Cruyningen in Sawdy's system such that devices can easily be managed; for example an additional unit of storage being added into an existing storage channel partition (page 3 paragraph 42). Cruyningen does not disclose first and second array controller units within a storage array controller module. Grouping of disks into units is not equivalent to the claimed detail of first and second array controller units. Regardless whether Cruyningen describes a storage array configuration in which multiple disk units are grouped and controlled by the controller, this is unrelated to first and second array controller units within a storage array controller module. In the present invention, each storage array controller module comprises two redundant array controller units. Cruyningen discloses the utilization of switches to partition I/O channels. Sawdy and Rauscher fail to cure the defects of Cruyningen.

Further, there is no motivation to use the teachings of Sawdy, Rauscher, and Cruyningen in combination. All three references relate to completely different areas of the storage system field. Sawdy relates to cabling verification in a storage system. Rauscher relates to protecting a storage system against having a single point of potential failure. Cruyningen relates to utilization of switches to partition I/O channels in a storage system. All three references solve totally different problems with totally different approaches. There is no motivation in Sawdy, Rauscher, and Cruyningen to combine the disparate disclosures to solve the problem addressed by the present invention. Obviousness cannot be established by combining the teaching of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. Under section 103, teachings of references can be combined only if there is some suggestion or incentive to do so. *ACS Hosp. Sys., Inc. v. Montefiore Hosp.,* 732 F.2d 1572, 221 USPQ 929 (Fed. Cir. 1984). Thus, the Examiner may not use the patent application as a basis for the motivation to combine or modify the prior art to arrive at the claimed invention. The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification. .... It is impermissible to use the

claimed invention as an instruction manual or 'template' to piece together the teachings of the prior art so that the claimed invention is rendered obvious. This court has previously stated that "[o]ne cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention." *In re Oetiker*, 977 F.2d 1443, 24 USPQ 2d 1443 (Fed. Cir. 1992) *quoting In re Fine*, 837 F.2d 1071, 1075, 5 USPQ 2d 1596, 1600 (Fed. Cir. 1988).

> The Dean statement is of the type that gives only general guidance and is not at all specific as to the particular form of the claimed invention and how to achieve it. Such a suggestion may make an approach "obvious to try" but it does not make the invention obvious. .... We recognize that given the teaching in appellant's specification regarding incorporation of the gene into the chromosome and utilizing the bacteria in the plant environment, one can theoretically explain the technological rationale for the claimed invention using selected teaching from the references. This approach, however, has been criticized by our reviewing court as hindsight reconstruction. *Ex parte Obukowicz* at 1065.

Since obviousness cannot be established by combining the teaching of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination, Claim 1 should be allowed.

For at least these reasons, Claim 1 is allowable. Claims 2, 4 and 8-9 depend from Claim 1, which is non-anticipatory and non-obvious based on the rationale above. Thus, Claims 2, 4 and 8-9 are allowable based on their dependence from Claim 1.

<u>Claims 3</u>

The issue is whether the Examiner has properly rejected Claim 3 under 35 U.S.C. §103(a) as being unpatentable over Sawdy, Rauscher, and Cruyningen in further view of Brocade (Quick loop data sheet). Claim 3 depends from Claim 1, which is non-anticipatory and non-obvious based upon the rational above. Thus, dependent Claim 3 should be allowed based on its dependence on an allowable base claim.

<u>Claims 5-7</u>

The issue is whether the Examiner has properly rejected Claims 5-7 under 35

U.S.C. §103(a) as being unpatentable over Sawdy, Rauscher, Cruyningen, in further view of Deng, U.S. Patent 6,937,608 (Deng). Claims 5-7 depend from Claim 1, which is non-anticipatory and non-obvious based upon the rational above. Thus, dependent Claims 5-7 should be allowed based on their dependence on an allowable base claim.

Claims 10-12, 14-18, 20, and 22-27

The issue is whether the Examiner has properly rejected Claims 10-12, 14-18, 20, and 22-27 under 35 U.S.C. §103(a) as being unpatentable over Sawdy, Rauscher, Cruyningen, in further in view of Workman et al., U.S. Publication 2004/0068591 (Workman), and Jantz, U.S. Patent No. 5,944,838 (Jantz).

The present application provides a novel and non-obvious method and system exploiting the failure handling capability of primary and secondary array controller modules, each comprising a first and second array controller unit, and a switch and a state machine for lock step synchronization between the controllers. Thus, in addition to redundantly controlling an array of storage devices, expanded failure handling is provided. Expanded failure handling may include: controller module failure wherein both array controllers in a module are prevented from accessing the drive trays, active controller failure wherein the alternate controller is prevented from accessing the drive trays, and standby controller failure wherein the active array controller is prevented from accessing the drive trays.

"To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations." (emphasis added) (MPEP § 2143). If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. (emphasis added) *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

Claims 10 and 22 includes elements that have not been disclosed, taught or suggested by Sawdy, Rauscher, Cruyningen, Workman and Jantz. As to Claim 10, the Examiner stated the rejection was based on the same rationale as the rejection of Claim 1, which is non-anticipatory and non-obvious based on the rationale above. Claim 1 is allowable based on the rationale above and thusly, for the same reasons, Claim 10 is allowable.

The Examiner then went on and correctly admitted that Sawdy, Rauscher, and Cruyningen do not describe the claimed handshaking protocol. The Examiner went on to cite to Workman as describing "a handshake protocol on the heartbeat path between the first and second storage controllers to determine which of the first and second storage controllers to process the command (page 3 paragraphs 30-31, Fig 2)." The Examiner stated it was obvious to include the heartbeat signals suggested by Workman in Sawdy's system to monitor and determine if a switch over is required (page 3 paragraph 30 lines 16-23). Workman does not disclose a handshake protocol on the heartbeat path between the first and second storage controllers to determine which of the first and second storage controllers to process the command. In the cited section of Workman, the controllers monitor the heartbeat connection and act accordingly if the heartbeat connection is interrupted. A handshake protocol is a sequence of negotiations between two or more communicating devices, requiring mutual agreement. Workman does not discuss a handshake protocol at all. Both controllers monitor the heartbeat connection. They act based on the condition of the heartbeat connection. There is no negotiation and no mutual agreement by the controllers in Workman. Thus, Workman does not disclose a handshake protocol on the heartbeat path between the first and second storage controllers to determine which of the first and second storage controllers to process the command. Sawdy, Rauscher, Cruyningen, and Jantz fail to cure the defects of Workman.

The Examiner then correctly admitted that Sawdy, Rauscher, Cruyningen, and Workman do not disclose the claimed command queue. The Examiner went on to cite

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to Jantz as describing "separate queues containing pending commands for each I/O paths A, B. In the situation of a failure on the first I/O path A, the command is executed and removed from the alternated queue of path B (col. 7 lines 5-35)." The Examiner stated it was obvious to include the command queues suggested by Jantz in Sawdy's system so that the I/O pending requests can be rapidly identified and restarting all such identified I/O requests on the alternate good I/O path (col. 7 lines 28-35). Jantz does not disclose separate queues at all. In the cited sections, Jantz discloses a RDAC software layer that contains an I/O queue of pending I/O requests. I/O requests come from the application layer and are handled by the RDAC layer. The RDAC layer attempts to process the request on the first I/O path. If the first I/O path fails to process the request the RDAC layer attempts to process the I/O request on a second I/O path. Only when the I/O request is successfully processed is the I/O request removed from the I/O queue. However, the RDAC layer is a software layer separate from the control modules and there is only a single queue. The control modules do not contain queues. Jantz does not disclose separate queues. The queue is not contained in the control modules. Thus, Jantz does not disclose the claimed command queue. Sawdy, Rauscher, Cruyningen, and Workman fail to cure the defects of Jantz.

For at least these reasons, Claim 10 is allowable. The Examiner stated Claim 22 was rejected on the same rationale as Claim 10, which is non-anticipatory and non-obvious based on the rationale above. Claim 10 is allowable based on the rationale above and thusly, for the same reasons, Claim 22 is allowable.

Further, the Examiner has combined no less than five references to meet each limitation of Claims 10 and 22 and has failed to provide any support for combining each of the five references. Rather, the Examiner is impermissibly selecting features from five references in a combination set forth by the present application and stating the combination is obvious. Obviousness cannot be established by combining the teaching of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. Under section 103, teachings of references can be combined only if there is some suggestion or incentive to do so. *ACS Hosp. Sys., Inc. v.*

Montefiore Hosp., 732 F.2d 1572, 221 USPQ 929 (Fed. Cir. 1984). Thus, the Examiner may not use the patent application as a basis for the motivation to combine or modify the prior art to arrive at the claimed invention.

The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification. .... It is impermissible to use the claimed invention as an instruction manual or 'template' to piece together the teachings of the prior art so that the claimed invention is rendered obvious. This court has previously stated that "[o]ne cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention." *In re Oetiker,* 977 F.2d 1443, 24 USPQ 2d 1443 (Fed. Cir. 1992) *quoting In re Fine,* 837 F.2d 1071, 1075, 5 USPQ 2d 1596, 1600 (Fed. Cir. 1988).

> The Dean statement is of the type that gives only general guidance and is not at all specific as to the particular form of the claimed invention and how to achieve it. Such a suggestion may make an approach "obvious to try" but it does not make the invention obvious. .... We recognize that given the teaching in appellant's specification regarding incorporation of the gene into the chromosome and utilizing the bacteria in the plant environment, one can theoretically explain the technological rationale for the claimed invention using selected teaching from the references. This approach, however, has been criticized by our reviewing court as hindsight reconstruction. *Ex parte Obukowicz* at 1065.

Since obviousness cannot be established by combining the teaching of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination, Claims 10 and 22 should be allowed.

Claims 11-12, 14-18 and 20 depend from Claim 10, which is non-anticipatory and non-obvious based on the rationale above. Thus, Claims 11-12, 14-18 and 20 are allowable based on their dependence from Claim 10. Claims 23-27 depend from Claim 22 which is non-anticipatory and non-obvious based on the rationale above. Thus, Claims 23-27 allowable based on their dependence from Claim 22.

<u>Claims 19 and 21</u>

The issue is whether the Examiner has properly rejected Claims 19 and 21 under 35 U.S.C. §103(a) as being unpatentable over Sawdy, Rauscher, Cruyningen, Workman, Jantz, in further view of Ito et al., U.S. Publication 2003/0014600 (Ito). Claims 19 and 21 depends from Claim 10, which is non-anticipatory and non-obvious based upon the rational above. Thus, dependent Claims 19 and 21 should be allowed based on their dependence on an allowable base claim.

Conclusion

For the foregoing reasons, it is respectfully submitted that in each of the rejections discussed herein under 35 U.S.C. § 103(a), the Examiner has failed to show that the proffered references teach or suggest each and every element of the claimed invention. Accordingly, reversal of all outstanding rejections is earnestly solicited.

Respectfully submitted,

LSI Logic, Inc.,

Dated: February 7, 2007   By: _____

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(8)   CLAIMS APPENDIX

1.   A storage array network, comprising:

a first and second storage array controller module, wherein each storage array controller module has a first and second array controller unit; and

an array of storage devices,

wherein the first storage array controller module is a primary storage array controller that performs storage array controller functions and the second storage array controller module is a redundant back up,

wherein the first storage array controller module provides an availability signal to the second storage array controller module,

wherein if the second storage array controller module does not receive a signal from the first storage array controller module within a given period of time, the second storage array controller module asserts control over the array of storage devices.

2.   The storage array network of Claim 1, further comprising a storage array switch electrically connected between the first and second storage array controller modules and the array of storage devices.

3.   The storage array network of Claim 2, wherein the storage array switch is a Fibre Channel quick loop switch.

4.   The storage array network of Claim 1, further comprising first and second interface switches and first and second host devices electrically connectable to the first and second storage array controller modules through the first and second interface switches.

5.   The storage array network of Claim 1, wherein the first array controller units of the first and second storage array controller modules are grouped together into a first multicast group.

6.   The storage array network of Claim 5, wherein a host broadcasts a command to the first multicast group.

7.   The storage array network of Claim 6, wherein frames for the first array controller unit of the first storage array controller module are forwarded to the first array controller unit of the second storage array controller module.

8.   The storage array network of Claim 1, wherein redundancy and drive control is accomplished through multiple storage array controller modules.

9.   The storage array network of Claim 1, wherein, if one of the storage array controller modules fails, another storage array controller module assumes control.

10.   A method for maintaining operation of a storage array network system, comprising:

       submitting a command to a primary array controller module and a secondary array controller module;

       performing a handshaking protocol between the primary array controller module and the second array controller module to determine which of the primary and the second array controller modules is to process the command;

       removing the command from a queue of the secondary array controller module; and

       timing of an aspect of the command.

11.   The method of Claim 10, wherein the step of performing a handshaking protocol includes the substeps of, if the primary array controller module is able, sending a primary module ready signal to the secondary array controller module;

       if the secondary array controller module is able, sending a secondary module ready signal to the primary array controller module; and

       if the primary array controller module is able, processing the command before an expiration of a given time.

12. The method of Claim 11, wherein the step of performing a handshaking protocol includes the substeps of if the primary array controller module is able, sending a primary module acknowledge signal to the secondary array controller module upon receipt of the secondary module ready signal.

14. The method of Claim 10, wherein the step of performing a handshaking protocol includes the substep of disabling ports associated with a drive tray bank associated with the primary array controller module.

15. The method of Claim 10, wherein if the primary array controller module successfully handshakes with the secondary array controller module within a given time, the primary array controller module processes the command.

16. The method of Claim 15, wherein if the secondary array controller module unsuccessfully handshakes with the secondary array controller module within a given time, the secondary array controller module processes the command.

17. The method of Claim 10, wherein when the timing reaches a time limit, processing of the command is performed by the secondary array controller module.

18. The method of Claim 17, wherein the time limit is measured from a time of transmission of the command from a host.

19. The method of Claim 18, wherein the command is transmitted from the host through an interface switch to the primary and secondary array controller modules.

20. The method of Claim 10, wherein redundancy and drive control is accomplished through multiple storage array controller modules.

21.   The method of Claim 19, wherein, if one of the storage array controller modules fails, another storage array controller module assumes control.

22.   A method for establishing a redundant array controller module in a storage array network, comprising:

receiving a command by primary and secondary array controller modules from a host;

storing the command within two queues, each of the queues being associated with one of the primary and secondary array controller modules;

if the primary array controller module processes the command before a time out, then removing the command from the queue of the secondary array controller module; and

if the primary array controller module times out, then processing the command by the secondary array controller module.

23.   The method of Claim 22, wherein both the primary and secondary array controller modules are in active mode.

24.   The method of Claim 22, wherein one of the primary and secondary array controller modules is in standby mode.

25.   The method of Claim 22, wherein, if the primary array controller module times out, the secondary array controller module disables ports associated with a drive tray bank of the primary array controller module.

26.   The method of Claim 22, wherein redundancy and drive control is accomplished through multiple storage array controller modules.

27.   The method of Claim 22, wherein, if one of the storage array controller modules fails, another storage array controller module assumes control.

(9)   EVIDENCE APPENDIX

None

(10)   RELATED PROCEEDINGS APPENDIX

None